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Subintimal Angioplasty of Native Vessels in the Management of Occluded Vascular Grafts

S. R. Walker*[1], V. G. Papavassiliou[1], A. Bolia[2] and N. London[1]

[1]*Department of Vascular Surgery, University of Leicester, Leicester, U.K. and* [2]*Department of Radiology, Leicester Royal Infirmary, Leicester, U.K.*

Objectives: *to assess the results of subintimal angioplasty of native vessels in the presence of an occluded vascular bypass graft.*
Design: *retrospective case note review.*
Materials: *twelve patients presenting with symptoms of lower limb ischaemia who had previously undergone infra-inguinal bypass surgery and in whom the bypass graft had occluded. These patients were treated by attempting subintimal angioplasty of the occluded native vessels.*
Results: *there were seven technically successful procedures but after a median follow up of four weeks, only one case had persistent patency of the previously occluded segment.*
Conclusions: *although subintimal angioplasty of occluded native vessels in the presence of an occluded bypass graft appears attractive, the results are disappointing.*

Key Words: Vascular graft occlusions; Subintimal angioplasty.

Introduction

Occlusion of lower limb bypass grafts remains a significant problem and the management of such cases can be both complex and controversial. Previous case reports from both this institution and others[1,2] have demonstrated the feasibility of subintimal angioplasty of the native occluded vessel in the management of the limb with an occluded bypass graft. We now report a larger series of such procedures with particular regard to the early outcome.

Materials and Methods

Data were collected retrospectively on all patients undergoing native vessel subintimal angioplasty for treatment of occluded lower limb arterial bypass grafts between November 1997 and November 2000. Such patients were identified from the angiogram room register, the local vascular audit database and from records of lower limb arterial duplex scans performed during this time period. Twelve such patients were identified and the patients notes and angiogram reports were studied. The median age of these patients was 75 years (range 57–83 years), there were nine males, 11 had a history of cigarette smoking, none were diabetic. The indications and nature of the previous arterial surgery are shown in Table 1. Three patients had been in a graft surveillance program, four patients were taking aspirin and four were on warfarin at the time of graft occlusion.

Table 1. Indications for and nature of original arterial bypass surgery in 12 patients undergoing native vessel subintimal angioplasty.

	Number ($n=12$)
Indication	
Short distance claudication	3
Chronic rest pain	7
Acute onset rest pain	2
Surgical procedure	
Common femoral to above knee popliteal bypass	9
Common femoral to below knee popliteal bypass	2
Common femoral to distal vessel bypass	1
Conduit	
Reversed vein	2
Synthetic graft	8
Umbilical vein graft	2

* Please address all correspondence to: S. R. Walker, Consultant Surgeon, Royal Lancaster Infirmary, Ashton Road, Lancaster LA1 4RP, U.K.

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Table 2. Occluded native vessel segments in which subintimal angioplasty were attempted.

	Number
External iliac and superficial femoral artery	1
Superficial femoral artery	7
Superficial femoral and popliteal artery	4

The onset of new symptoms was a median of 17 months (range 0.5–204) following the original bypass surgery. Ten patients presented with rest pain and two with short distance claudication. All graft occlusions were confirmed by duplex scan. The technique of subintimal angioplasty has been previously described.[3] Technical success was defined as recanalisation with antegrade flow at the conclusion of the procedure through the previously occluded native artery.

Results

The occluded segments in which subintimal angioplasty were attempted are shown in Table 2. Of the twelve cases there were seven technically successful procedures. In those in whom the procedure was technically unsuccessful (in all cases this was due to difficulty in establishing a subintimal channel at the site of the proximal anastomosis), these patients were subsequently managed by conservative treatment in two, a lumbar sympathectomy in one, a femoro-distal bypass in one and by a profunda femoris bypass in one. Following a median follow up period of 50 weeks, three remain stable with rest pain, one who underwent a femoro-distal bypass has reoccluded their graft and has subsequently undergone an above knee amputation. A second patient has undergone a major amputation following failed conservative management. No patient was treated with long-term anticoagulation.

Of the seven cases where subintimal angioplasty was technically successful, following a median follow up of 4 weeks only one case had a patent recanalised segment, the remainder having occluded. The subsequent management in the six cases where subintimal angioplasty was technically successful but then the recannalised segment reoccluded are shown in Table 3.

Discussion

With advances in interventional radiological techniques, arterial bypass surgery is increasingly being reserved for those patients in whom angioplasty has failed or is contraindicated. None the less, there are

Table 3. Subsequent management in six cases where subintimal angioplasty was technically successful but the recannalised segment later occluded.

	Original indication for bypass surgery	Type of bypass surgery	Symptoms with occluded graft	Recannalised segment following angioplasty	Follow-up (weeks)	Outcome
1	Chronic rest pain	PTFE fem AK popliteal	Rest pain	SFA	2	15 days following angioplasty represented with acute ischaemia and underwent fem distal
2	Acute rest pain	PTFE fem AK popliteal	Rest pain	SFA	20	Represented with rest pain. SFA has reoccluded and underwent ilioprofunda bypass which remains patent after 2 years
3	Acute rest pain	Reversed LSV fem BK popliteal	Rest pain	SFA and popliteal artery	4	Represented with rest pain. Underwent ilio anterior tibial bypass which occluded 5 months later
4	Chronic rest pain	PTFE fem AK popliteal	Rest pain	SFA and popliteal artery	28	Follow-up duplex showed reocclusion but as not symptomatic, treated conservatively
5	Chronic rest pain	PTFE fem AK popliteal	Rest pain	SFA	Lost to follow-up	
6	Chronic rest pain	Reversed vein fem AK popliteal	Claudication	SFA	26	Represented with rest pain. Reoccluded SFA segment reangioplastied. Presented 4 months after with rest pain and underwent fem AT bypass with PTFE which occluded at 4 months follow-up and required an above knee amputation.

still large numbers of patients at risk of vascular graft occlusion. The option for the management of these patients include graft thrombectomy, graft thrombolysis and angioplasty, redo bypass surgery and conservative management. This study has demonstrated poor outcomes following native vessel subintimal angioplasty in the presence of an occluded graft. Many of the patients in this study will either have had their initial surgery in another hospital and have been referred to this tertiary referral centre for consideration for redo surgery, or will have been operated upon locally before the advent of subintimal angioplasty, or had a previously failed attempt at angioplasty, resulting in bypass surgery. With increasing experience with subintimal angioplasty it may be that some of these patients would now be treated more successfully by primary subintimal angioplasty rather than surgery. So whilst subintimal angioplasty of native vessels in the presence of an occluded vascular graft seems attractive, this study has shown that the results are poor. However, these patients often have little to loose in the attempt to save the limb as the results of surgical management in the presence of an occluded graft are also poor. The further options available to these patients are also limited as shown by only two patients with technically unsuccessful angioplasties going on to redo bypass surgery.

There are mainly two reasons for the primary technical failure of subintimal angioplasty in the presence of an occluded bypass graft, both relate to the anastomotic sites. The fibrous tissue and subintimal hyperplasia at the proximal anastomosis makes it difficult to enter the origin of a flush superficial femoral artery occlusion and therefore the initiation of the dissection channel. At the distal anastomosis, due to the same pathology it is difficult to proceed with the dissection channel and reenter the true lumen distal to the anastomosis. The guide-wire loop has a tendency to be deflected back at the anastomotic sites. A further reason, although not encounted in patients within this study may be difficulty in gaining vascular access within a scared, previously operated upon groin.

The reason for the failure of technically successful subintimal angioplasty are less obvious but may be related to the technical difficulty of the procedure resulting in a poorly flowing channel or to the extensive nature of the vascular disease resulting in a run off problem.

The technical success rate (58%) is lower than reported in other series for subintimal angioplasty in the presence of an occluded graft (74–85%).[4,5] However it must be remembered that many of these patients have failed previous primary angioplasty, hence the need to progress to bypass surgery.

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